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June 27 2003

Inclusive Jet Cross Section Update: 146 pb^{-1}

Preblessing for Summer 2003 conferences...

We now have updated results based on 146 pb^{-1}, 70% more data than was presented in the Spring (85 pb^{-1}) conferences.

Better understanding of the energy scale uncertainty (5% $\rightarrow$ 3%)

Starting to compare the data to MC

Looking at the resolution functions used in the unsmearing

We have significantly improved results that are ready to show at the Summer conferences (EPS, Lepton-Photon,...)

Will add more data as it becomes available - plan to have *one* updated result to be shown at the Summer conferences...

Analysis details can be found in CDF6298 (writeup for the blessed Spring 2003 results)

Plots collected at:

`http://ncdf76.fnal.gov/~chlebana/qcd/ana/incJet/blessSummer2003/`

- Same unsmearing procedure as used in Run I and for the preliminary Run II results

- Used offline version 4.10.4

- Redid Calorimetry and Jet reconstruction
→ corrected the falling response in the high η region...

- Using the 5.5% energy scale correction and 3% uncertainty

- Offline luminosity scaled by 1.9%

ntuples based on DataAccess located at:

`fcdfsgi2:/cdf/data40b/s0/qcd/chlebana/jets_4.10.4`

Good Run Selection

```
AND rc.SHIFTCREW_STATUS = 1
AND rc.RUNCONTROL_STATUS = 1
AND RC.RUNNUMBER >= 138815
AND rc.CLC_STATUS = 1
AND rc.L1T_STATUS = 1
AND rc.L2T_STATUS = 1
AND rc.L3T_STATUS = 1
AND rc.CAL_STATUS = 1
AND rc.CAL_OFFLINE = 1
AND (rc.COT_STATUS = 1 OR rc.COT_OFFLINE = 1)
```

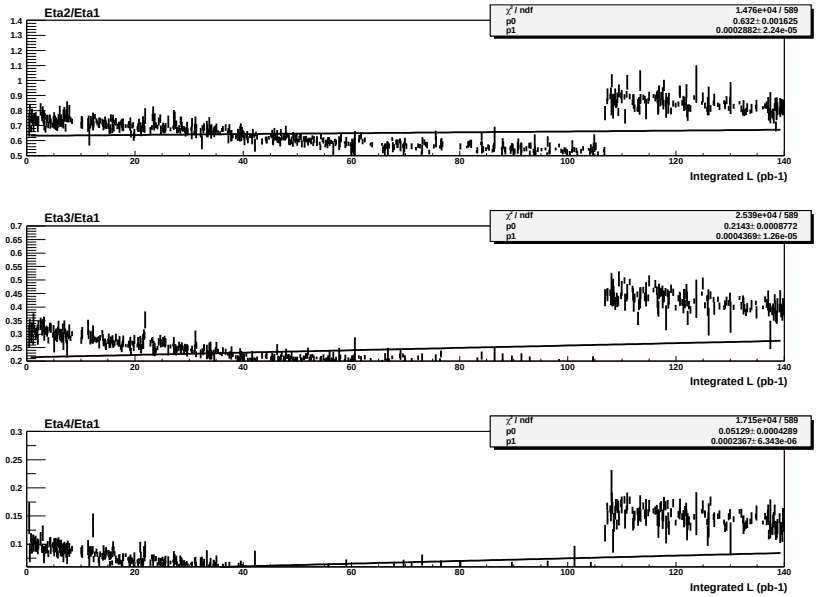
Started with gjet08 and gjet09 datasets: 174 pb^{-1}

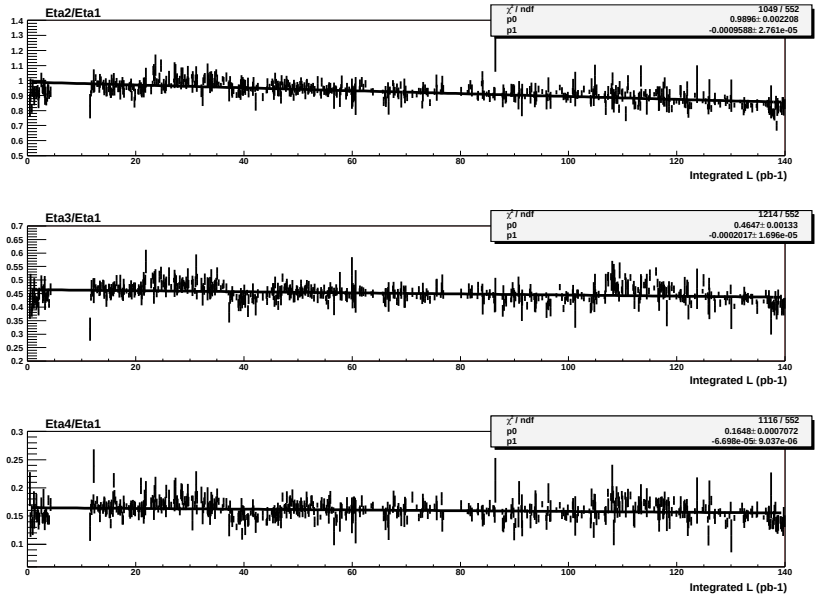
Offline bits set for runs: 138815 - 163527
No "good run info" for runs: 163956 - 164958 (about 11 pb^{-1})
Just included these runs...

Also require that event count for the J20 in ntuple match with that recorded in the database, removed 25 runs for 8.4 pb^{-1}

32 pb^{-1} do not pass this good run criteria
About 5 pb^{-1} of data unprocessed (June 19)

Some of the run dependence on the jet energy scale was removed in the reprocessing (offline version 4.10.4)



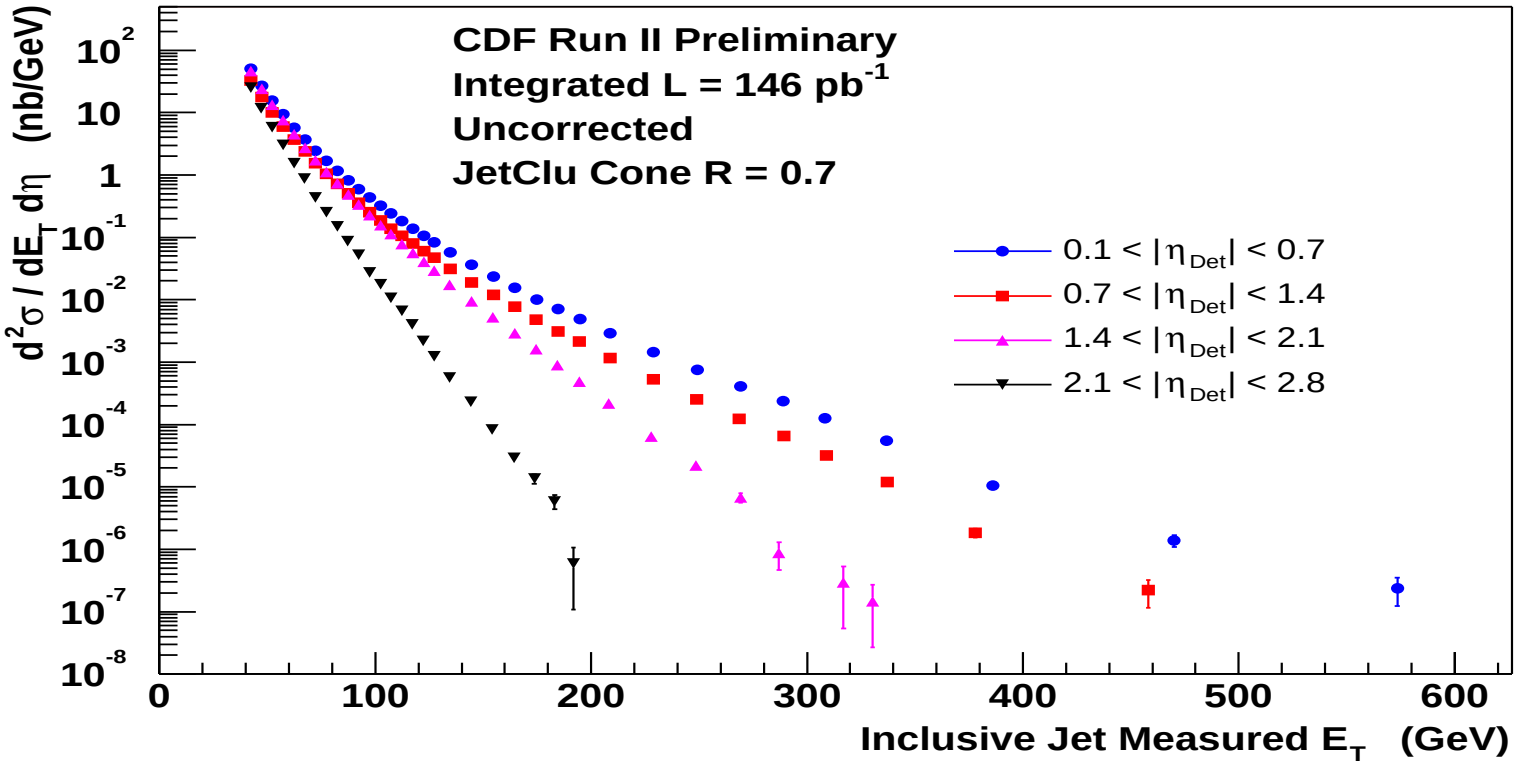


Opens up the possibility to start looking in the forward η region

Jet energy corrections depend on the version of the offline used to process the events, corrections are now available for 4.10.4 or 4.11.1.

May be already able to look at the ratio of cross section for the forward region to the central... Same Side/Opposite Side jets...

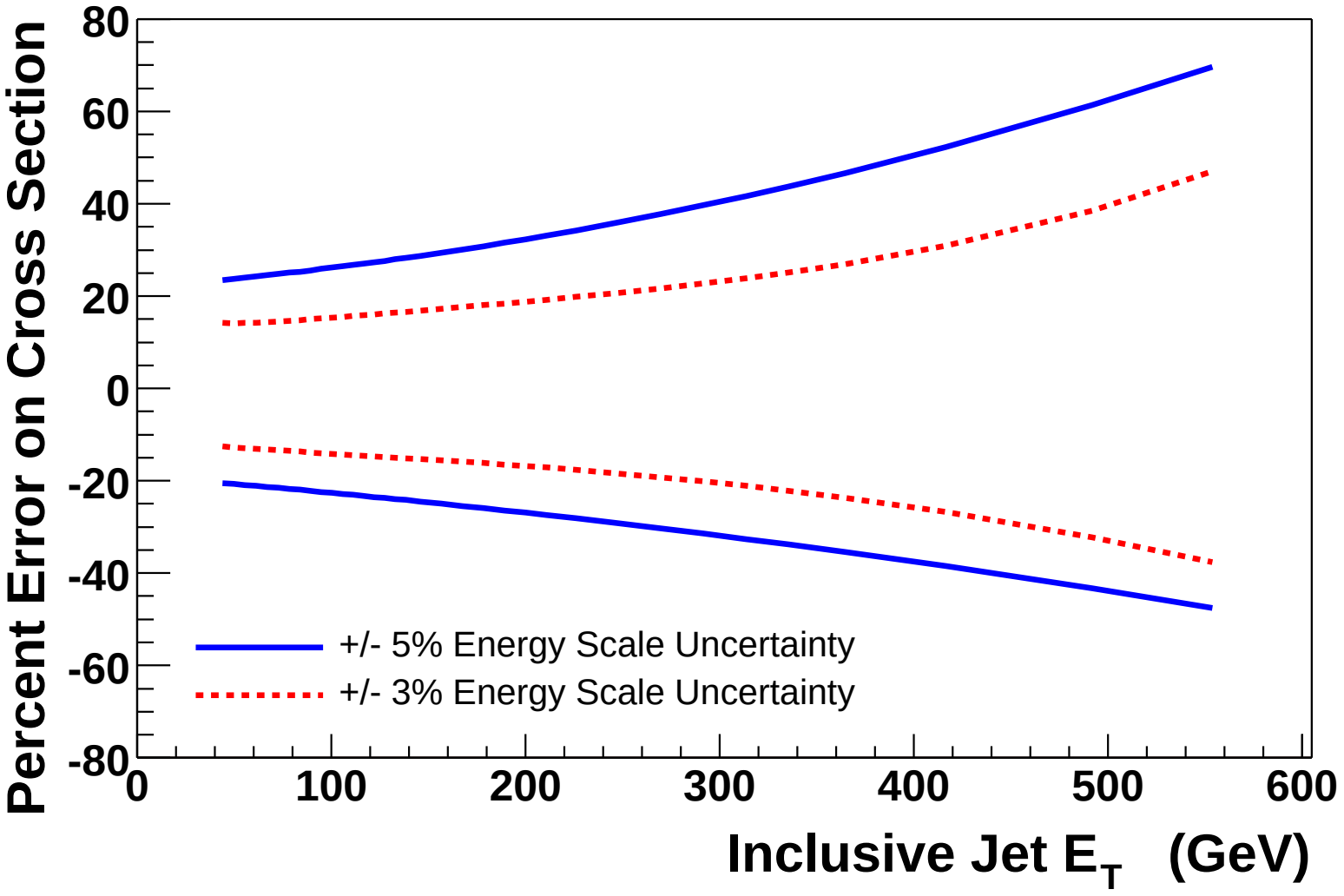
For Blessing...



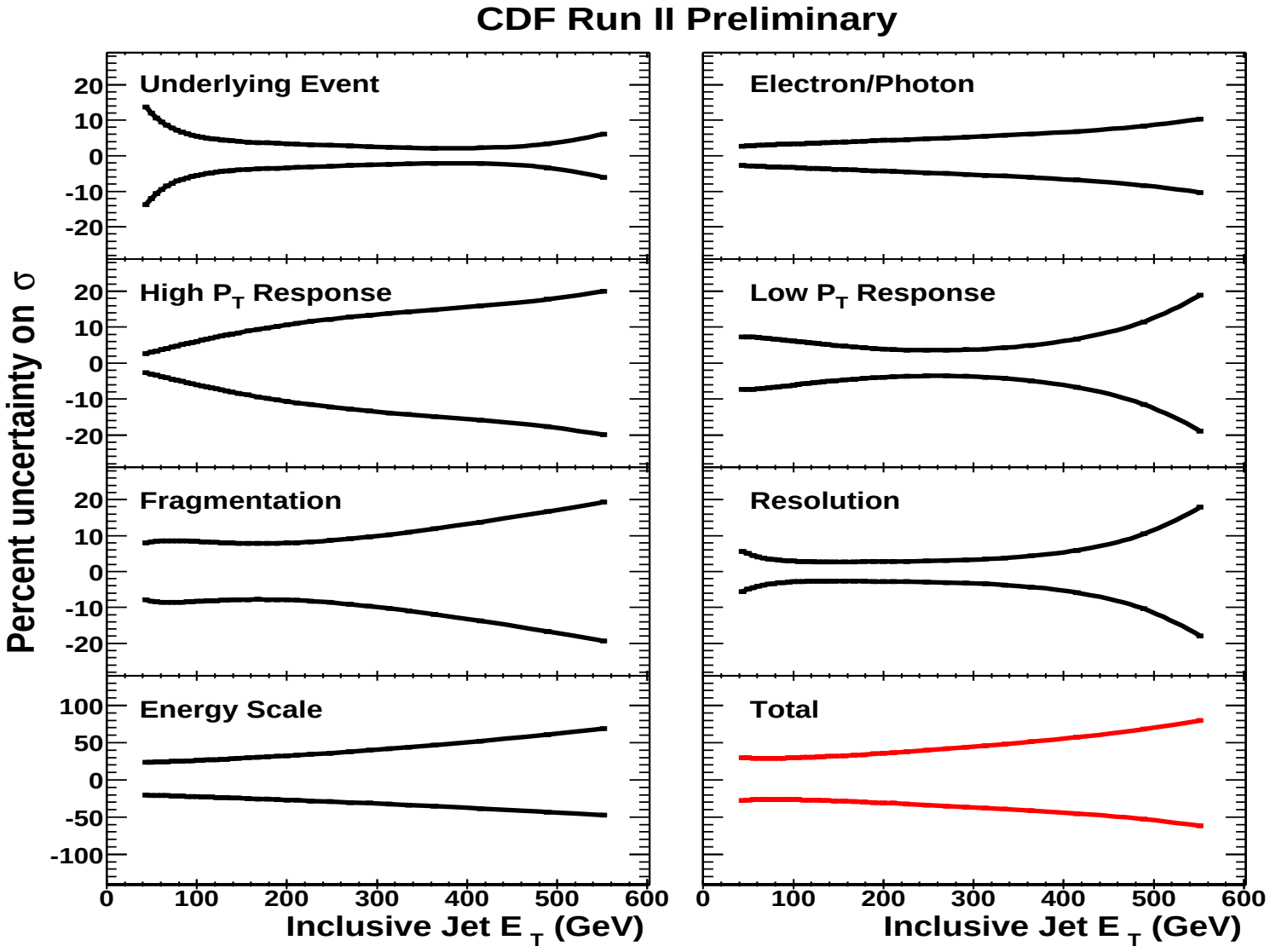
Need to have the response functions determined for the forward region $\rightarrow$ inclusive jet cross section measurement in the forward region...

The dominant source of systematic error comes from the energy scale uncertainty (reduced from 5% to 3%).

For Blessing...

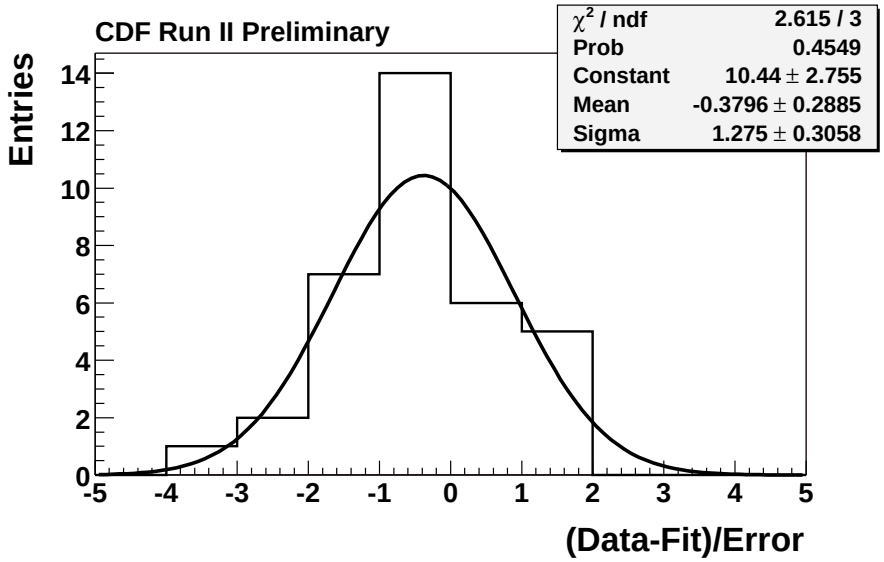


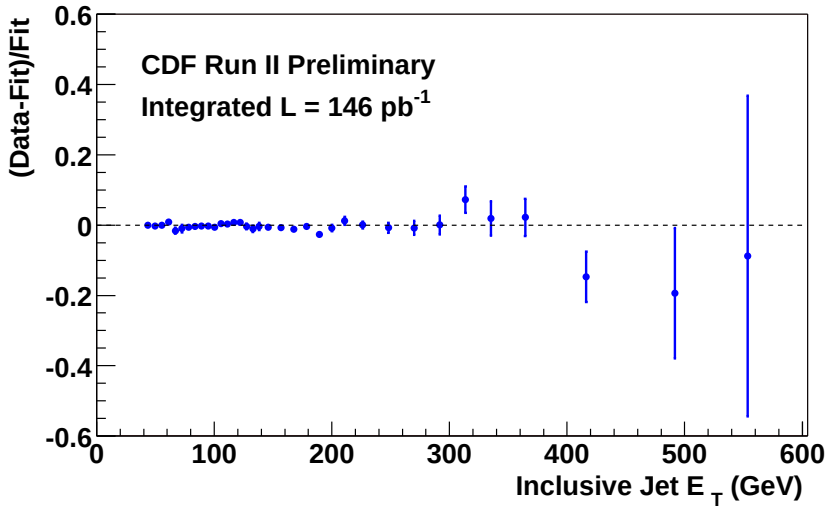
For Blessing (need to update with 3% Energy Scale error)...



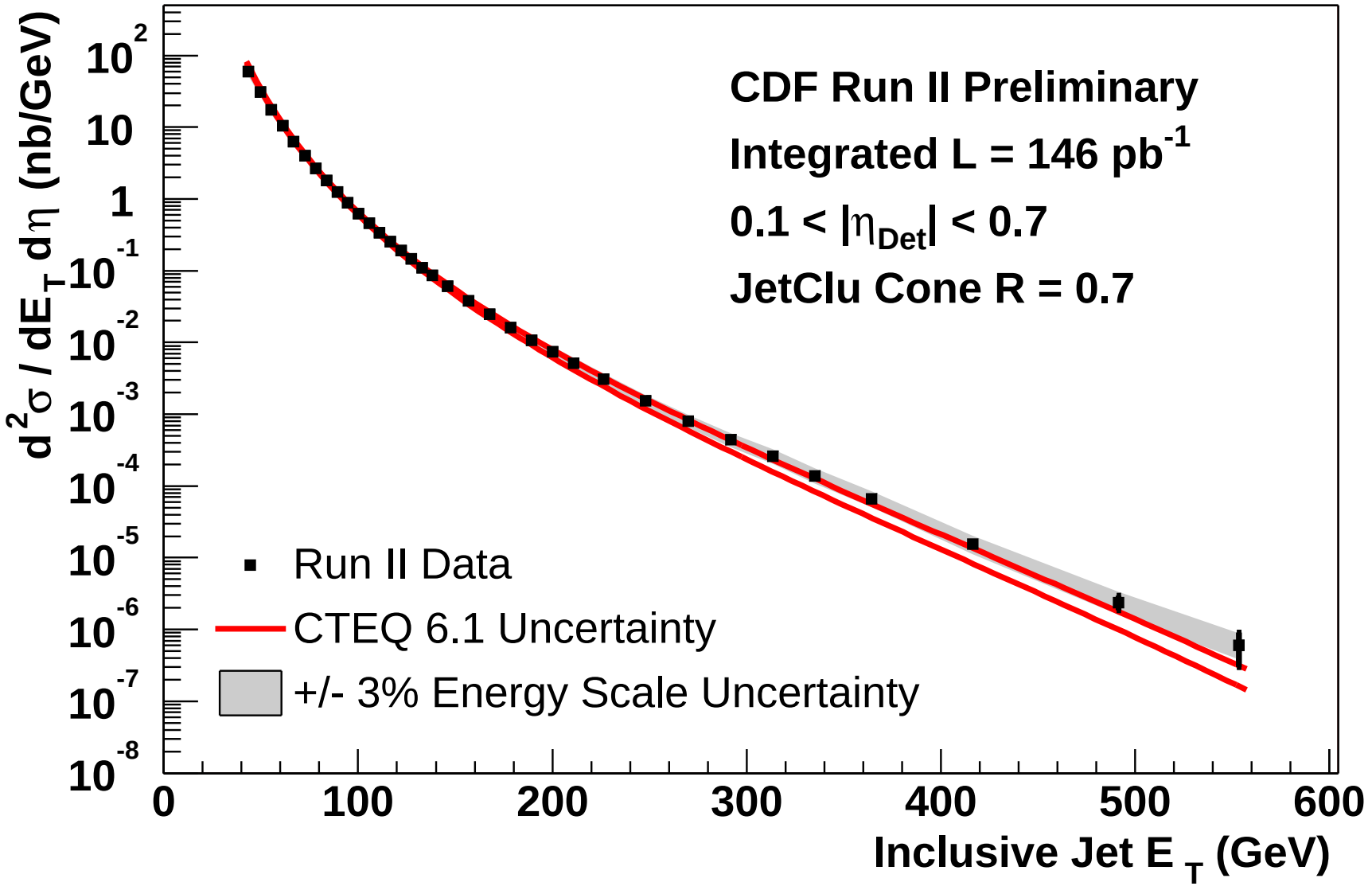
With the increased statistics the data is smoothing out.

For Blessing

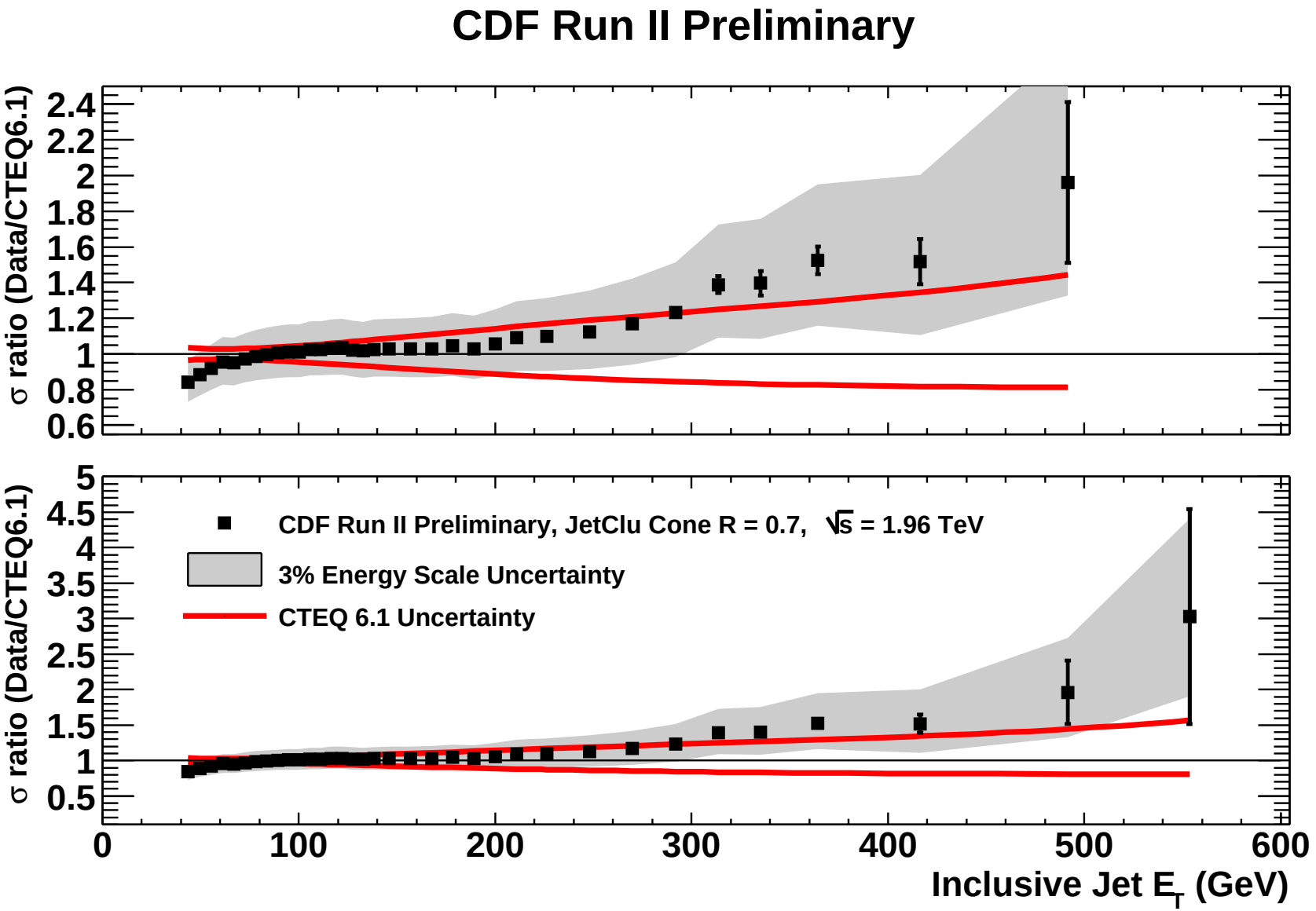




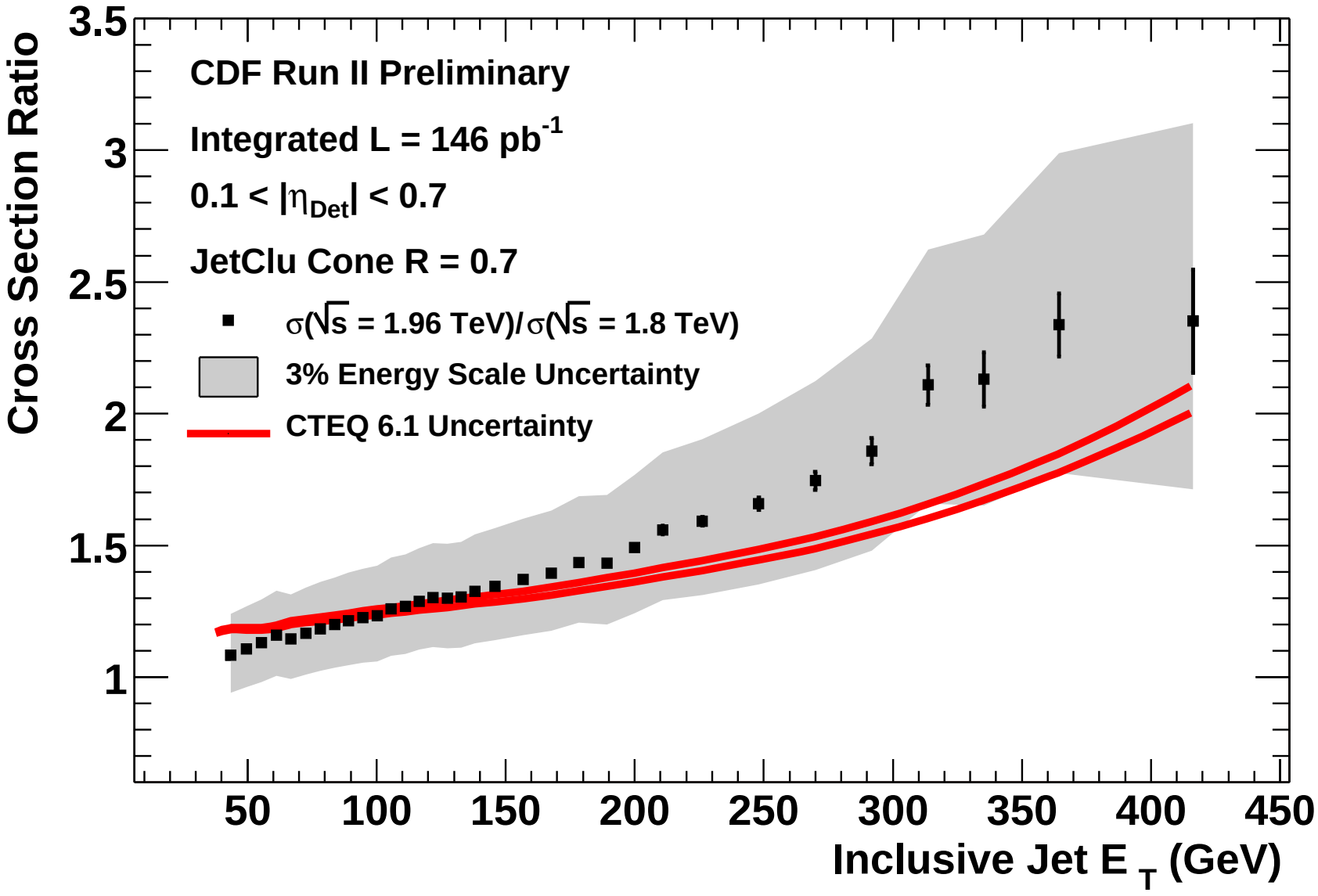
For Blessing...



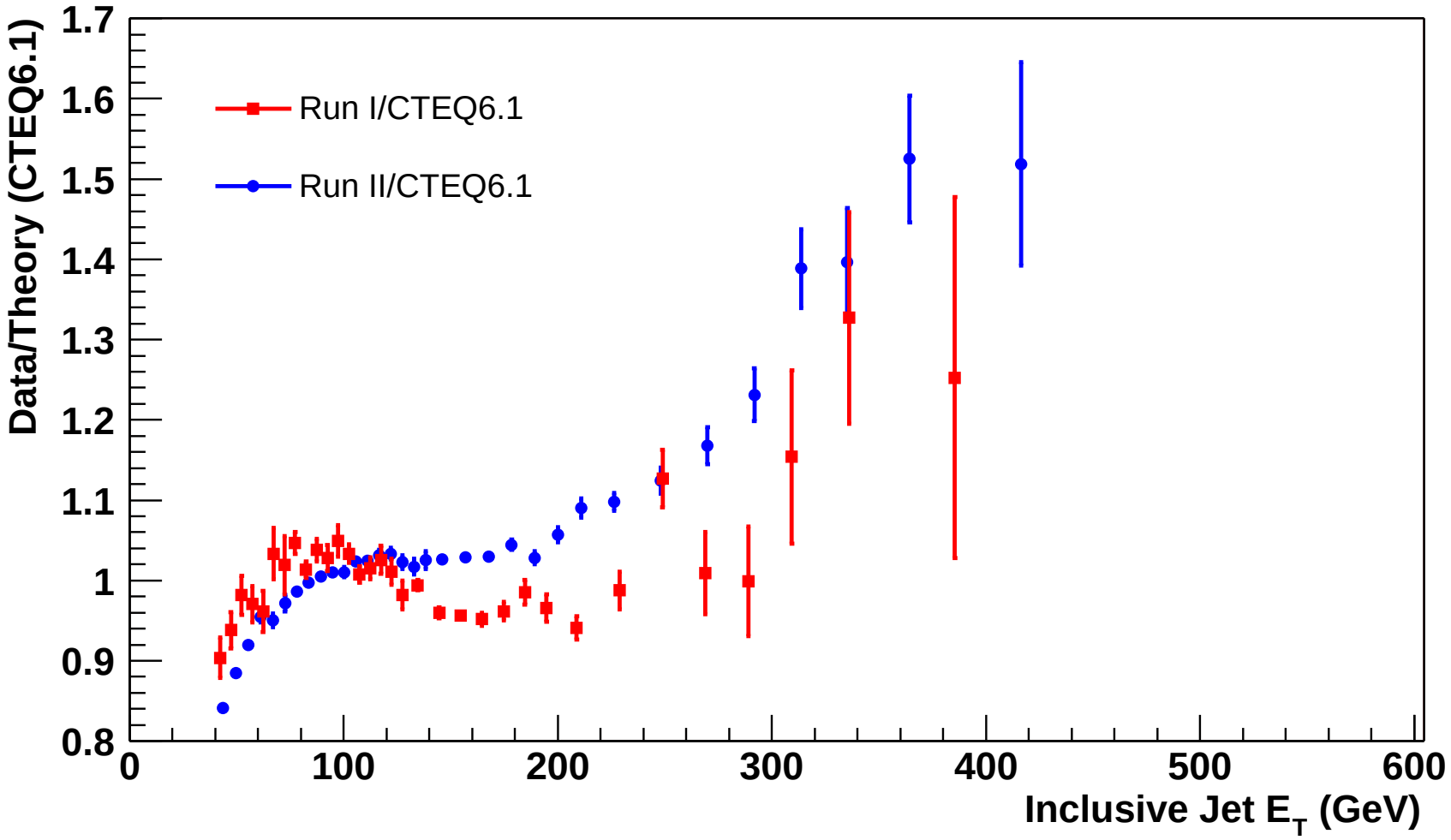
For Blessing…



For Blessing…



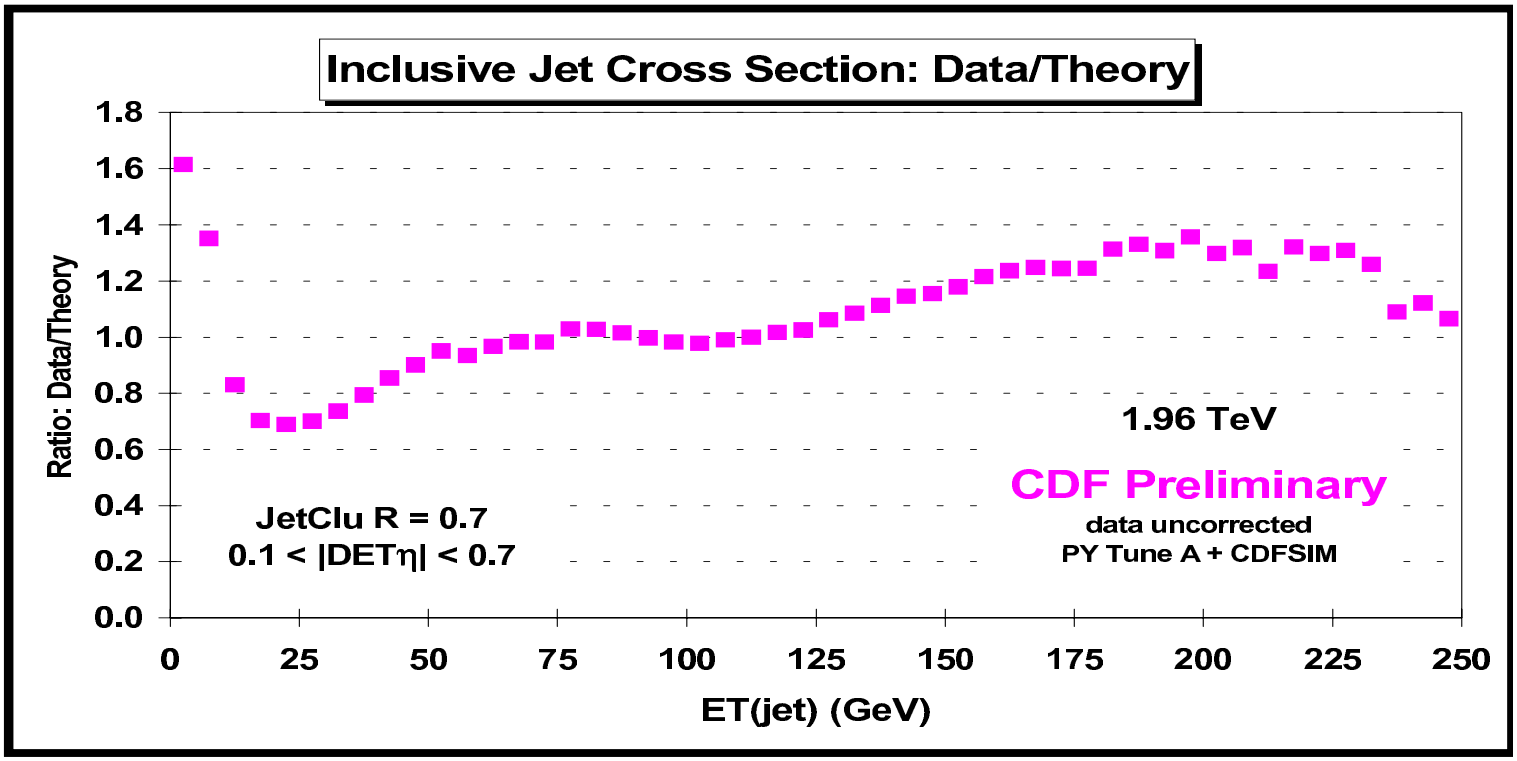
With the increased statistics we are better able to resolve the shape of the E_T distribution.



MC Comparisons: Pythia Tune-A sample with CTEQ 5L

When comparing the measured distribution of data and MC see qualitatively the same shape

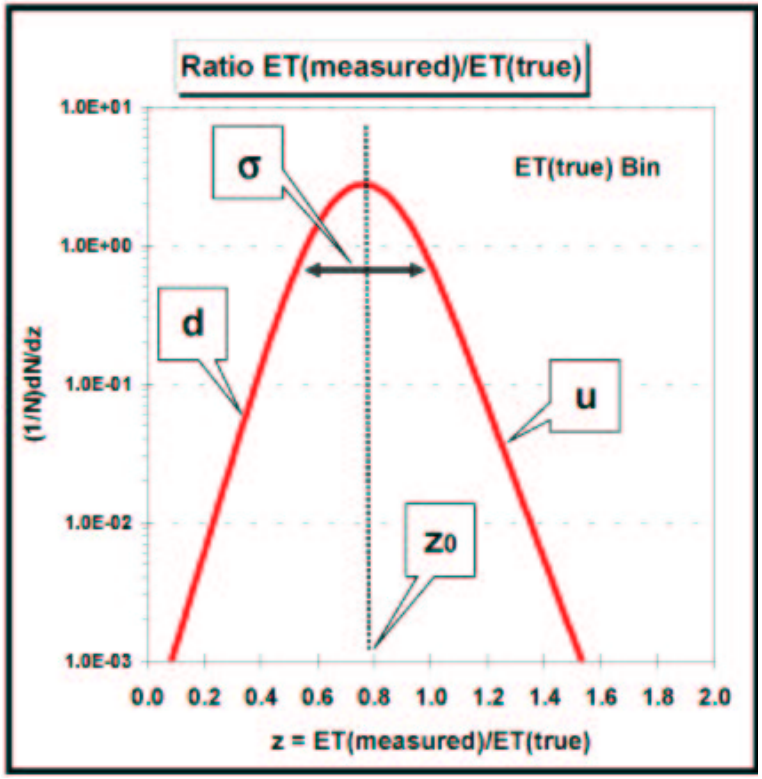
$\rightarrow$ Fall off at low E_T and rising at high E_T.



Plot from Rick Field. MC statistics are low beyond 200 GeV

Unsmearing/Resolution Functions

Jay and Rick are looking at the resolution functions that are used in the unsmearing.

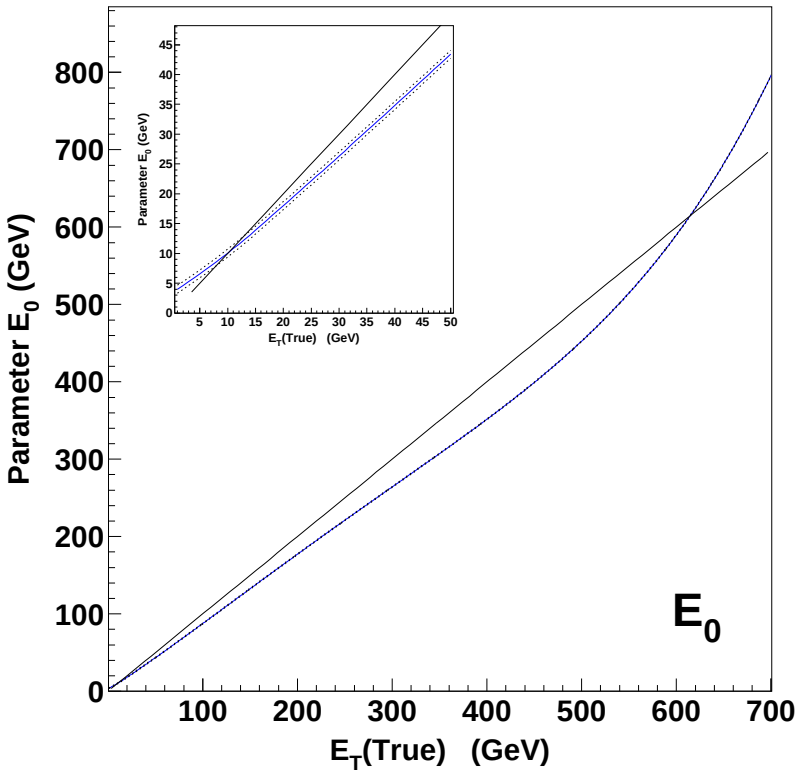


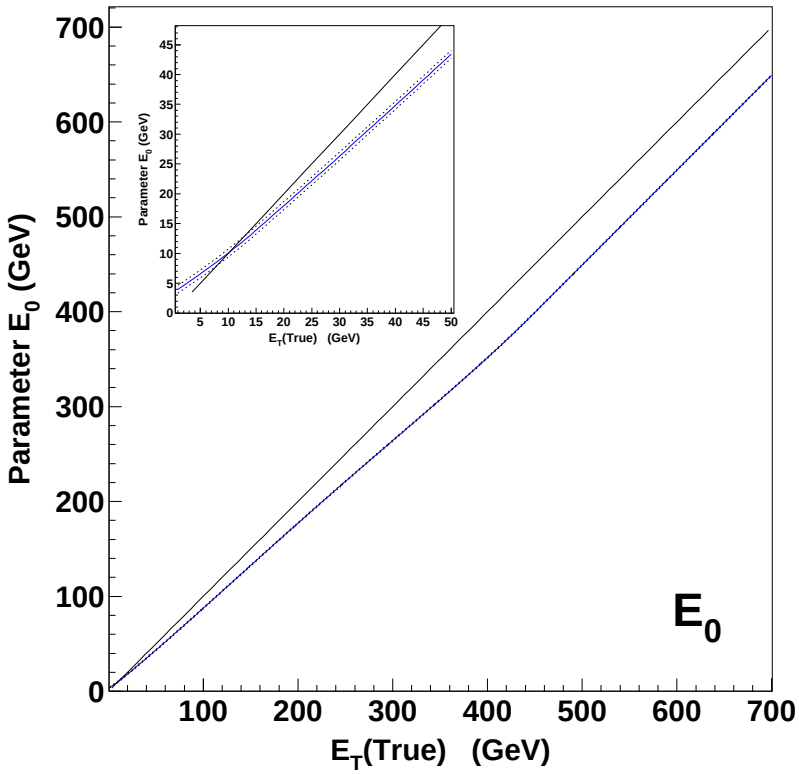
Response functions are parameterized as a function of the measured E_T.

See Rick Field's "Response Function" talk from the QCD June 13, 2003 meeting.

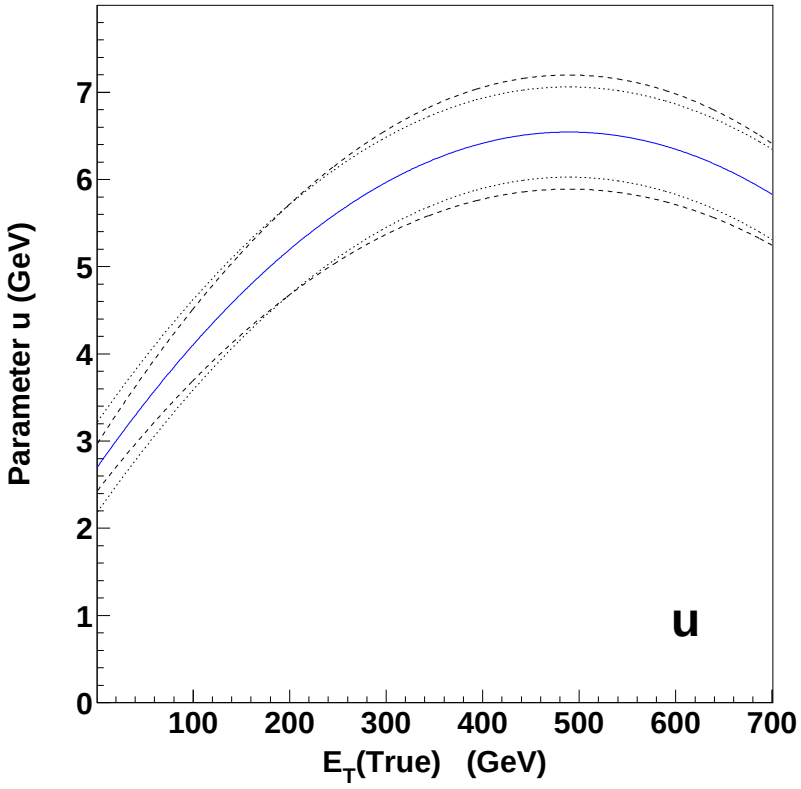
One concern is that in Run I we were only worried about jets with *low* E_T (out to 400 GeV).

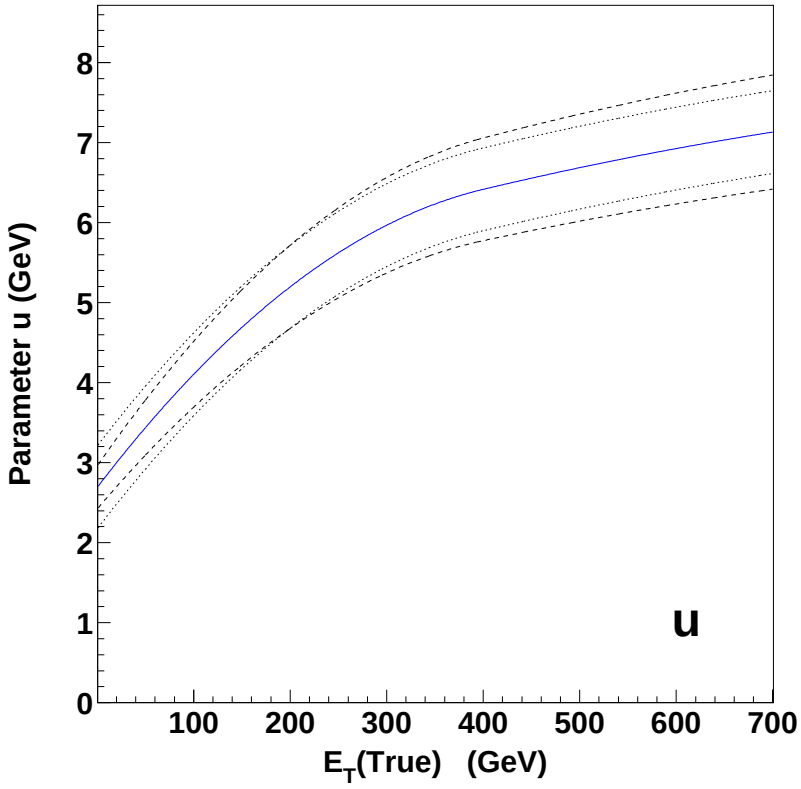
Want to make sure that the resolutions functions behave reasonably out to the higher E_T values seen in run II (550 GeV).





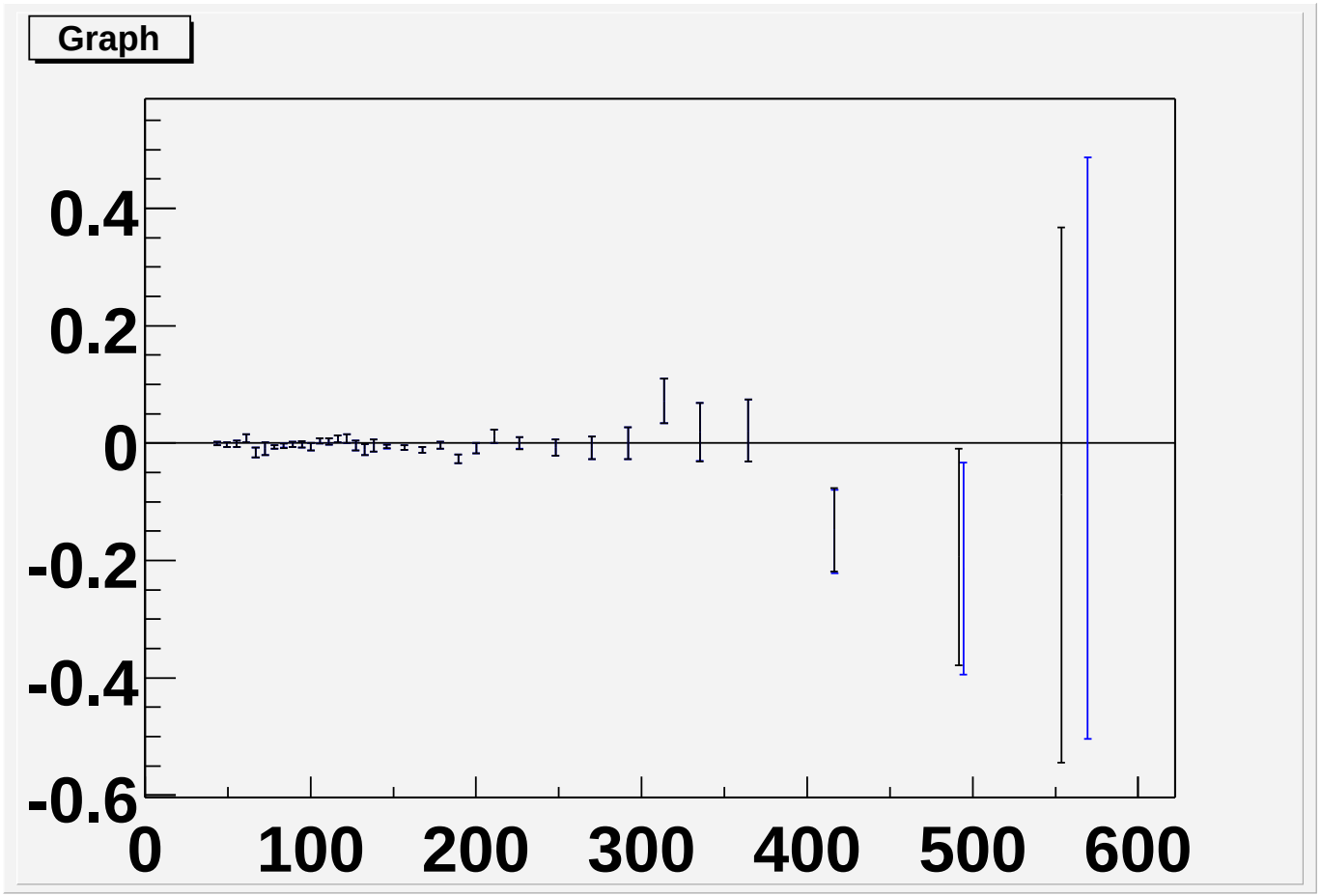
E0 is the mean value (same as z0)...





Looked at the change in the cross section when varying the tails in the distributions.

The effect on the corrected cross section is negligible



Black points is the corrected cross section using the default parameterization

Blue points is the correction cross section after changing the response functions

Conclusions/Still To Do

- Close to nearly doubling the data sample 85 $\rightarrow$ 146 pb^{-1}
$\rightarrow$ The increased statistics is smoothing out the data

- Better understanding of the energy scale uncertainty 5 $\rightarrow$ 3%

- Plan to add more data as it becomes available up to $\sim$July 11 when final plots will be made for the blessing

- Good run settings need to be determined for the full sample.

- Would like to scan the events in the highest E_T bins.

- Comparisons of the MC and DATA measured distributions have the same qualitative features

- Varied the resolution functions used in the unsmearing $\rightarrow$ had a negligible effect on the corrected cross section.

- May need to present results showing the total systematic error rather than just the 3% energy scale uncertainty